Indexing concepts and/or named entities

Pino Buizza

Indexing process, considered in any of its forms, produces conceptual representations of documents and information retrieval systems, that is to say the ways to find documents for their conceptual value. Otherwise, searching by words or by sequences of characters, either in full texts or in formal records, retrieves the phrases through which thoughts are recorded in documents. Also traditional indexing uses terms that do not properly denote concepts: proper names denoting unique entities. By examining the nature and the value of proper names, and of the entities that they name, this study aims at understanding their place in assigned indexing, and whether it is simply comparable to that of concept terms, or if any difference requires different treatments.

Morphology

The couple "concept or named entity" appears in the principle of the uniform heading, the first of IFLA's *Principles underlying subject heading languages (SHLs)* (1999). The principle refers to both elements in the same way. In the naming principle, "names of persons, places, families, corporate bodies and works" are mentioned to recommend the use of the same form used in author and title catalogues. No

JLIS.it. Vol. 2, n. 2 (Dicembre/December 2011).
DOI: 10.4403/jlis.it-4707

other difference is stated between the two elements of the couple. Therefore, it is assumed, and actually commonly practiced in alphabetical subject indexing, that named entities have a separate treatment in authority control systems or authority files. This affects only the vocabulary, the form of headings, the morphology or formal side of indexing. As a matter of fact, even within these limits, the issue is not so simple, for a couple of reasons. First, because the access points created for descriptive cataloguing, and the entities that they represent, always stand by themselves; while in subject indexing, due to the complexity of the theme of a work, the same entities may be linked to other terms in a string and incorporated in a phrase. An issue may raise: whether a personal name has to maintain the inverted form or to assume the direct one when it is not the entry word (e.g. *Romantic drama – Influence by Shakespeare, William*, or *– Influence by William Shakespeare*).[1] Moreover, not every named entity is represented in name authority files. The criteria used to choose the form of the name for persons and corporate bodies that are not responsible for any work or expression (e.g. *Alexander the Great*), may be the same suggested by the cataloguing rules. Objects, equally not recorded in name authority files (e.g. *Venus de Milo*), have no criteria at all in cataloguing rules; thus, their names should be chosen according to reference sources or other controlled lists, and to general criteria for preferred form of terms in controlled vocabularies.

[1] The form preferred by *Nuovo soggettario* is the first one, see the example: Influssi [di] Ovidius Naso, Publius (Biblioteca nazionale centrale di Firenze, *Nuovo soggettario: Guida al sistema italiano di indicizzazione per soggetto, Prototipo del Thesaurus* p. 123); the brackets divide the two terms. This is not the case for Library of Congress Subject Headings (LCSH) and Répertoire d'autorité-matière encyclopédique et alphabétique unifié (RAMEAU), where the subject is broken into two separate headings.

Different features

Apart from these preliminaries, in the present paper my main interest, is not in the form of the names. The real question is conceptual, not formal: with regard to the theory and the models of subject indexing, which are the differences between concepts and named entities? If there are any. In this paper I will try a simple analysis of concepts and named entities, to test their nature and the correctness of their separation or identification.

«Concept is a unit of thought. It is formed by mentally combining some or all of the characteristics of a concrete or abstract, real or imaginary object», or by abstracting the common characteristics of similar concrete or abstract, real or imaginary objects. «Concepts exist in the mind as abstract entities independent of terms used to express them» and of the concrete or abstract, real or imaginary nature of the object(s) that generated them (*ANSI/NISO Z39.19-2005. Guidelines for the Construction, Format, and Management of Monolingual Controlled Vocabularies* 4.1).[2] Named entities have the double characteristic of being unique entities and being identified by a proper name (named). Named entities are not named in the standards for thesaurus construction. Unique entities and proper names are treated there in a marginal way: their inclusion in the thesaurus is not necessary, the control of their form is necessary but not ruled, and they appear in the instance relationships (*ANSI/NISO Z39.19-2005. Guidelines for the Construction, Format, and Management of Monolingual Controlled Vocabularies*2.3; 6.3.3; 6.6.7; 8.3.2; *ISO/CD 25694-1. Thesauri and Interoperability with other Vocabularies. Pt. 1: Thesauri for Information Retrieval* 7.6.9; 11.2.4).

Following the classical lesson of Ranganathan (*Prolegomena to*

[2]This definition is consistent with that of ISO 2788, stating more concisely: «a unit of thought», and that of BS 8723 and ISO 25694-1, confirming the brief form and adding the second quoted sentence as a note.

Library Classification), three planes can be considered: the idea plane, the verbal plane and the notational plane. On the first, each unique entity is an instance of the class to which it belongs; it shares the specificities of the class with the other members, but not its own accidental characteristics, its identity. The concept is the class of these individuals and is defined by shared characteristics. On the verbal plane, natural languages use common nouns for concepts, for sets of individuals and for unique not identified individuals (generally with indeterminate article, if different kinds of article are available); while for identified individuals they use common nouns with determinate article or with other determiners that are enough in the context, or definite descriptions, or, at last, proper names. Aiming at effective searching, controlled verbal indexing languages formalise both common nouns and proper names in uniform and univocal ways. This is carried out by means of authority control and equivalence relationships between different terms or names for the same entity or different forms of terms or names. The terms for concepts are chosen from subject headings lists or from thesauri, with the semantic value of common nouns and the implicit or explicit stipulation of hierarchical and associative relationships between concepts. Proper names for authors and other named entities are chosen following cataloguing rules or reference works or convenient customs. No other link than references between different forms of names for the same unique entity is stipulated.

The notational plane is typical of classification systems and does not apply to subject headings. For the latter, the syntactic plane may be considered in an extensive analogy: complex subjects are formally and consistently represented by building pre-coordinate strings. In this regard, systems based on the specificity principle favour the treatment of a unique entity as the core or key element in a complex subject. Their syntax distinguishes the concepts (which may be sub-

divisions), and named entities (which are usually excluded, except geographic entities). Systems based on terms and strings and on logical roles treat both without any difference.[3] Another difference may be found in bibliographic formats (both MARC21 and UNIMARC), where different codes are provided for entities whose instances are typically denoted by proper names (personal names, corporate body names, family names, names and titles, titles, geographical names as subjects in fields 600-602, 604-605 e 607 of UNIMARC bibliographic). The use of these fields instead of the generic "topical name" (606), is devoted just to named entities, not to the corresponding categories of concepts, which include, for example for persons, any kind of qualification, such as professional, social conditions, etc. (e.g. engineers, the poor). Notes on field contents acknowledge a different use from that "for persons responsible for the content of an item", as terms may be added to further specify form, topic, place or time.

Named entities and proper names

However, the correspondence between named entities and proper names is not exact. There are unique entities represented by a non-absolute proper name. Depending on the higher or lower perception of the individual personality within a certain category of entities, which is the reason why a proper name is received, there are unique entities represented by a proper name in association with a common noun denoting the class to which it belongs (e.g., hurricanes: Hurricane Charlie!); or by a noun phrase consisting of a common noun plus other distinguishing elements, for instance place and time definitions (e.g., the earthquake in Haiti on Jan. 2010, formally:

[3]The difference is typically shown confronting the provisions of old *Soggettario*, with subdivisions for biographic headings, and *Nuovo soggettario*, where persons' logic role is analysed to fix their place in the string.

Earthquake – Haiti – 2010, Jan. 12). On the contrary, some proper names represent a plurality, not a unique entity, but are often considered single entities, as they are often treated as such, and works about one instance are unusual. They are mass-produced items, considered to be a single model, but consisting of sets of identical and separate objects (e.g., Automobile Citroen 2cv is not the same as *my* Citroen 2cv, number plate AZ175NJ...); biological species, being the class of plants or animals with similar features and able to reproduce (e.g., Leontopodium Alpinum or Edelweiss, the name of all the flowers of this species); and recurring time entities, considered to be one entity for their typical permanent characteristics, but actually instantiated many times, at each recurrence (Christmas vs. Christmas 2009, 2010. . .). Specific types of material or of uncountable products may have a proper name, generally accompanied by a common noun. For example, "Chianti" or "Bordeaux" are the proper names of the regions of origin of the wine, so that they are properly called "Chianti wine" and "Bordeaux wine", while the olive oil of the same region is not called Chianti olive oil, but olive oil from Chianti, and, in a formal language, Olive oil – Italy – Chianti. In verbal indexing languages, the presence of a common noun (hurricane, earthquake, automobile, wine) associated to the proper name assures the insertion of the term into the class and the semantic net to which it belongs; while, the proper names that remain absolute are maintained isolated from their class and semantic context: Leontopodium Alpinum and Christmas do not appear as flowers and feasts.

Linguistics

In linguistics the differences between common nouns and proper names have been carefully studied. A wide range of different char-

acteristics has been pointed out, in grammar and in syntax, as well as in current usage and in interlinguistic practice (for example in translation and transcription). The syntactical behaviour of proper names closely corresponds to personal and demonstrative pronouns due to their anaphoric value. Difficulties arise in defining some categories of names, and whether they should be considered proper or common names – like in a continuum between two polarities, in which there is an intermediate area where it is difficult to establish a boundary. This is the case, for example, of monoreferential expressions, like the moon and the earth, the names of chemical elements, currencies, months and periods of time, languages, diseases, etc. (gold, Deutschmark, February, Spanish, Aids). Leaving out linguistic details, which are beyond our competence, as well as hybrid and intermediate situations that would complicate the problem, let us focus on clear-cut types of proper names and particularly on semantic aspects – the most interesting in a discussion about subject indexing and knowledge organisation.

Philosophy of language

A long lasting exciting debate among philosophers of language, semiologists, linguists has lead us to focus on two opposite positions: the meaninglessness and the meaningfulness (or descriptivist) thesis. On one hand, the name of a unique entity – its proper name – is considered meaningless, it is only a referent, a way to denote the entity without saying anything about it. A proper name has only denotation and no connotative property. As J. S. Mill claimed: «Proper names are not connotative: they denote the individuals who are called by them; but they do not indicate or imply any attributes as belonging to those individuals. When we name a child by the name Paul, or a dog by the name Caesar, these names are simply

marks used to enable those individuals to be made subjects of discourse». «We put a mark, not indeed upon the object itself, but, so to speak, upon the idea of the object. A proper name is but an unmeaning mark which we connect in our minds with the idea of the object, in order to whenever the mark meets our eyes or occurs to our thoughts, we may think of that individual object». «All concrete general names are connotative. The word man, for example, denotes Peter, Jane, John, and an indefinite number of individuals, of whom, taken as a class, it is the name. But it is applied to them, because they possess, and to signify that they possess, certain attributes» (Mill, *A System of Logic, Ratiocinative and Inductive*I, Ch. II, § 5). On the other hand, many different levels of meaningfulness have been attributed to proper names. To mention only a few, Gottlob Frege assigned a sense (*Sinn*) to proper names too. Something between the proper name's reference (the object itself) and the subjective representations we may have of the object, and «opinions as to the sense may differ» («können freilich die Meinungen über den Sinn auseinandergehen») ("Uber Sinn und Bedeutung"); a sense which sometimes includes a lexical meaning, but rather comparable to an associative (pragmatic) meaning. Edmund Husserl argued for a one-to-one correspondence between extension (reference) and intension (meaning) (*Logische Untersuchungen* II, 1), without explaining the nature of this proprial intension, and how we can define it. Bertrand Russell considered proper names to be truncated or shorthand descriptions (*Introduction to Mathematical Philosophy* ch. 16). In Ludwig Wittgenstein's Tractatus logico-philosophicus the name means the object, that is to say that proper names merely denote. But in late Philosophische Untersuchungen the meaning of a proper name is constituted by the description one can provide of the thing named, not by the referent: in this way the meaning is not fixed. John R. Searle recognises that proper names do not have definitions, and the

descriptions are assigned to the name bearers only: proper names «function not as descriptions, but as pegs on which to hang descriptions». They «are logically connected with characteristics of the object to which they refer 'in a loose sort of way'» ("Proper Names" 170-2). The relation with a common noun is not a definite description, but merely a description or predicate (Everest is a mountain), providing a criterion of identity. And in *Speech acts* a distinction of functions is inserted: «the essential fact ... is that we have the institution of proper names to perform the speech act of identifying reference. The existence of these expressions derives from our need to separate the referring from the predicating functions of language» (*Speech Acts* 174). Saul Kripke restored the meaninglessness thesis: a proper name functions as a rigid designator if it has been assigned to a referent and passed on to other users; proper names are connected with their referents through a causal chain of references from an initial baptismal act, when the reference was assigned by ostension and/or description ("Naming and Necessity").

Semantic linguistics

From a linguistic point of view, Willy Van Langendonck says that the right question is «in what way the meanings are constructed and function», not whether proper names have a meaning or not. «In common nouns the meaning crucially determines the denotatum, in proper names, the meaning helps to retrieve an already given denotatum. For practical reasons, we can still call the meaning of common nouns 'conventional meaning', that of proper names 'associative meaning'. Moreover, both word classes do also show grammatical meaning» (38). «The traditional notions of intension and extension (reinterpreted cognitively) are necessary to distinguish proper names from common nouns. In proper names the

extension determines the intension whereas in common nouns it is the other way round» (56). Van Langendonck's tentative conclusions on the meaning of proper names are the following (84-86):

- proper names do not have asserted lexical meaning;

however, if presuppositional information can be called 'meaning':

- proper names do have presuppositional meaning:
  - categorical meaning, at the level of established linguistic convention (man, woman),
  - associative meaning, at the level of language use (from the description of the referent or from the form of the name),
  - emotive meaning (augmentative, diminutive),
  - grammatical meaning (definiteness, number, gender);
- the referent of proper names is a mental referent in the first palce, even for referents in the real world.

The proposed definition of proper name:

> A proper name is a noun that denotes a unique entity at the level of established linguistic convention to make it psychosocially salient within a given basic level category [pragmatic]. The meaning of a name, if any, does not (or not any longer) determine its denotation [semantic]. An important formal reflex of this pragmatic-semantic characterization of proper names is their ability to appear in such close appositional constructions as *the poet Burns, Fido the dog, the River Thames, or the City of London* [syntactic]. (87)

According to this linguistic analysis, which accepts the challenge of philosophy of language, even in the meaningfullness position a proper name is not like a term for a concept. It has no definition, while a concept has a definition. Its referent is unique, it can be described in many different ways, none of which is exhaustive; a concept is an abstraction from the features of a plurality of individuals. A definite description of the referent is a different function of the language from the referring function of the proper name. The denotatum of a proper name is given before its description and needs no definition to be determined. Basically, it is the mental referent, rather than the object in the real-world. Thus, a proper name representing a unique entity lacks the features of a common noun or noun phrase typically representing a concept. Some of these linguistic remarks may appear irrelevant in a discourse on indexing languages: the former apply to natural languages and their free expression in communication, the latter formalise terms and their use adopting rigidly controlled morphology and semantics, in a poor syntax. Nevertheless, some outcomes are useful for the following, specific sections.

Indexing languages

From the point of view of indexing languages, both concepts and named entities can be the aboutness of a work and their preferred terms or proper nouns are used in indexing systems. The difference is that the former can be related to one another (like in a thesaurus), according to the semantic relationships between their concepts, which are considered permanent as they are deduced from their definitions and generally from lexical meaning, not from chance associations within the development of a discourse. The latter have only a relationship to the category of their presuppositional

meaning, while asserted associations to other nouns or names pertain to autobiographic episodic memory and to language use. The former easily gain a place and role in knowledge organisation; the latter are exposed to different assertions about them, to the different mental images of their referents, for different people, in different contexts. Works about a named entity, even if focused on the same referent, are particularly suitable to give different descriptions and assertions.

In thesauri and subject indexing systems the instance relationship is typically used to connect a proper name to a term for the category of persons, or places, or things, etc. of which a named entity is an example, remarking that it is a hierarchical relationship neither generic nor partitive (*ANSI/NISO Z39.19-2005. Guidelines for the Construction, Format, and Management of Monolingual Controlled Vocabularies*8.3.2; *ISO/CD 25694-1. Thesauri and Interoperability with other Vocabularies. Pt. 1: Thesauri for Information Retrieval* 11.2.4). But, is it a real semantic relationship (a priori, independent from circumstances and documents) (*ISO 2788. Guidelines for the Establishment and Development of Monolingual Thesauri*Introduction), or is it only a good device to collect individuals and make their overall recall easier, without making a survey by name of the members of the category? Only the basic categorical presupposition should be permanent and context independent; but linguistic analysis shows that there is an appropriate level stated by linguistic conventions that, *just* for persons, is not "man/woman" but a more specific one, e.g. the nationality, profession, etc., that, for the same person, can change or be not pertinent in another context. If an instance relationship is established at a more specific level, this raises the issue of whether a proper name is allowed to have more than one instance relationship and to produce a polyhierarchy (e.g., Carla Bruni as an instance of models and/or of first ladies; Ronald Regan as an instance of actors

and/or of presidents of USA). In a system adopting polyhierarchies for generic relationships, of course they are allowed to be adopted for instance relationships too. In order to avoid inconsistencies in relationships, another way has been proposed, without using polyhierachies (GRIS, Gruppo di ricerca sull'indicizzazione per soggetto 3.4.4.3). Since the categories for persons are not permanent, but actually are fixed by the focus of the aboutness of works about persons, in the vocabulary no instance relationship is established, and a syntactic relationship represents the instance directly in the subject string for that work. In the subject heading the proper name is not recorded alone, but following the term for the category apt to contextualise it (e.g., p. 88: Architetti: Bernini, Gian Lorenzo, while for other works we could have: Scultori: Bernini, Gian Lorenzo, or simply: Bernini, Gian Lorenzo). Introducing a sort of classified style, this solution is in contrast with the traditional principle of specific subject heading: it is a way to give a proper name a meaningfullness that it does not have by its own, and to avoid linking a name with a profession for ever, even when this is not the matter. This option has not been adopted in *Nuovo Soggettario*, whose base and many choices are founded just on *Guida all'indicizzazione per soggetto*. The thesaurus of *Nuovo Soggettario* proposes «only as examples, some terms that can be considered proper names, such as names of wines, cheeses, breeds of dogs, some historical events» («solo a titolo esemplificativo, alcuni termini che possono ritenersi nomi propri, come nomi di vini, di formaggi, di razze di cani, di alcuni eventi storici», App. A, p. 201). The problem of inserting named entities into the net of meanings of an indexing system remains, and it is only partly reduced by the presence in strings for proper names of common nouns specifying the meaningful aspect of the named entity considered in the work (e.g., Buonarroti, Michelangelo – Pittura (Biblioteca nazionale centrale di Firenze, *Nuovo soggettario: Guida al sistema ital-*

iano di indicizzazione per soggetto, Prototipo del Thesaurus 4.4.2.1.6)). The distinction of the kinds of name used as subject that is found in the fields of MARC formats and is mentioned above, appears only formally useful (in morphology), even if an advanced management of subfields allows interesting search results. With regard to the last example above: all the works about the painting of a single painter are retrieved by searching the value "pittura" in the field 600 $x of UNIMARC, that is to say the search of a topic as subdivision ($x) of a personal heading (field 600).

Classification systems

In classification systems – a quick glance – unique entities (or class of one) usually have no dedicated notation, as the concept of uniqueness is the opposite of the plurality that a class implies, and there should be no notation for a class of one, even though exceptionally it can be the case. For example, in Dewey Decimal Classification William Shakespeare has his class number, due to the literary warrant requiring the distinct classification of his works; and, in religion, single gods, personalities and sacred texts may have their own class numbers assigned. Usually a unique entity is classed together with other unique (and not unique) entities of the same kind, in a class collecting them without distinction. In a hierarchical-enumerative system, a unique entity can be classed in different classes depending on the context in which it is involved, as it happens to common concepts; for example, in different disciplines. It has a place in a class or another, but it cannot be retrieved individually, as it is neither marked nor named in its own. Except that the system allows to add a proper name to the class number, functioning as a verbal extension to specify that the exact subject in that class is that person, as in Universal Decimal Classification (e.g., 1(091)MON-

TAIGNE = Philosophy: History: Montaigne). Any unique entity is located in the semantic context corresponding to the theme of the work about him or her, even if different in different works. Unique entities are scattered and contextualised like common concepts, but, having no name or number on their own, they are dissolved and reduced to the level of the concepts that are too specific to have a dedicated number in the classification. Once the element identifying the individual is removed, the question about the meaningfulness is dropped as well: the meaning is the same as that of the assigned class. In DDC, the example of Gian Lorenzo Bernini has generic solutions with 720.92 or 730.92 or other numbers convenient for the attributes he receives in the classified works. Moreover, following the teaching of Ranganathan, a class of one cannot exist, because even the most specific class may always be subdivided, depending on the specific boundaries of the discourses about it. If assigned classes, like proper names, have mental referents, it is neither difficult nor unreal to divide them without breaking the unit of the entity, simply by choosing some aspects (a sort of whole-part or possessor-property relationship) or adding connections with other concepts that limit the scope (syntactic relationships). In the same way, in subject headings languages, a proper name refers to a named entity, but it is also the term to collect a set of narrower topics related like specific parts of the subject (e.g. particular periods of a person's life, sectors of his activity, subdivisions of a geographic area, chapters of a work...) and other subjects related with the named entity (e.g. the works created by a person, the theories she or he elaborated, events she or he attended ...).

Beyond indexing

Taking a glance beyond subject indexing, some interesting implications may be mentioned. If a proper name for a named entity (person, collective body or work) is used in indexing systems with a catagorical meaning consisting in its mental referent – that is the mental image of the referent in the real world – its value and function are different from those the same name has as an access point in descriptive cataloguing where the mere denotating function is performed. Besides this, if the mental referent is theoretically open to receive almost any assertion, this means that each mental referent cuts out a particular profile of the named entity, based on assertions actually adopted. The value and the function of the name are likewise different if, in indexing languages, the semantic isolation of named entities is covered by instance relationships or by a classificatory context, while in cataloguing the same entities exist without any link to anything else. These not merely conceptual differences should be considered when systems are set up for storing and retrieving information. The undifferentiated searching by author and subject, which inserts a modern version of the dictionary catalogue into OPACs, bears the advantages of global visions on named entities. But the informative advantage is real if it is accompanied by clearness, otherwise it risks to cause confusion. Creating nominal and semantic access points, maintaining their distinction and their independent consistence with the respective functions, is the base for the effectiveness of both of them. The same is true for the searching functions, mainly if assigned indexing is supplemented by derived indexing and full text search, with or without hidden algorithms to increase the so called 'relevance' of results. In the field of information extraction in particular, the Named Entities Recognition (NER, or Named Entities Recognition and Classification, NERC) has become matter of study and a reason to develop tools for the automatic

recognition of named entities. Without going into this theme, it must be noticed at least that, searching in full texts in natural languages, it must be considered that a proper name could have very different functions from that of denoting its referent. It can act as metaphor or metonymy, per antonomasia, even an antonymic function, as well as be exposed to the plurality of attributions in case of homonymy. In this sense, as the referent may change from time to time, these cases should be called proprial lemmas instead of proper names, as it happens at lexical level. Therefore they go out of our survey, which is limited to assigned indexing, but they cannot be avoided in studies including derived indexing and in automatic information extraction. Nevertheless, mentioning the ambiguity in the use of proper names/propial lemmas in natural languages confirms that different uses of the same word are to be treated in different ways.

To conclude, what allows proper names to be inserted into a semantically organised net is their function of mental referent for the unique entities that they name; not in the same way as definite concepts, but for the set of assertions actually attributed to them. A clear distinction between concepts and named entities is useful to understand their place between individuality and contextualisation, and to adopt proper names in indexing and in controlled vocabularies, as well as for the relation between nominal and semantic access points, for the consideration of proper names in derived indexing and in full text information retrieval.

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PINO BUIZZA, Biblioteca Queriniana, Brescia
email gbuizza@comune.brescia.it

Buizza, P."Indexing concepts and/or named entities". *JLIS.it* Vol. 2, n. 2 (Dicembre/December 2011): 4707-1–4707-20. DOI: 10.4403/jlis.it-4707. Web.

ABSTRACT: Starting from a semantic rather than form a morphological point of view, the essay examines the problem of the meaning of proper names, with contributions coming from the philosophy of language and the semantic linguistics. Individual entities are explored: the way they are isolated in the thread of subjects, the illustrative relation, and the classification treatment. The deep differences between concepts and called entities suggest to declare them specifically in a theoretical way, and to adopt devices that lead to uniform but noticeable results in information retrieval systems.
KEYWORDS: Concepts; Language Philosophy; Personal Names; Semantic Indexing; Semantic Linguistics.
ACKNOWLEDGMENT: This article has been discussed as "Indexing concepts and/or named entities" to the 11th ISKO Conference, Paradigms and conceptual systems in knowledge organization, Rome, 23-26 February 2010, here extended since it is not published in the conference proceedings.

Submitted: 2011-04-13 / Accepted: 2011-04-16 / Published: 2011-06-15.